

Notice of Allowability

Application No.

10/606,487

Examiner

Anthony Fick

Applicant(s)

GEE ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to original filing of 6/26/06.
2. ☒ The allowed claim(s) is/are 1-15.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>1-4</u> | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in telephone interviews with Phil Askenazy on September 11 and 15, 2006.

The application has been amended as follows:

- a) Claims 16 through 31 have been cancelled.
- b) Specification page 6, line 26: "21" has been replaced with the following – 2J --.
- c) Specification page 8, line 19: "21" has been replaced with the following – 2J --.

Allowable Subject Matter

- 2. Claims 1 through 15 are allowed.
- 3. The following is an examiner's statement of reasons for allowance: the present invention of claim 1 involves a back-contacted solar cell comprising a p-type bulk substrate, a front side n+ emitter layer on the front side of the substrate, a n-gridline negative ohmic contact on the backside of the substrate, a p-gridline positive ohmic contact on the backside of the substrate and a solid n++ doped conductive via disposed through the substrate that electrically connects the front side emitter layer to the negative ohmic contact on the backside of the substrate. The prior art in the area of back-contacted solar cells utilize several variations to achieve electrical connections on

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the back of the solar cell. The art that is closest to present claim 1 is Gee (U.S. 5,468,652) and Kerschaver et al. (U.S. 6,384,317).

Gee discloses a method of making a back contacted solar cell as shown in figure 1. The solar cell is a p-type substrate of silicon with a set of laser drilled holes (vias) through the substrate (column 2, last paragraph). The vias are doped with phosphorus to produce n++ doped conduction paths between the n+ emitter layer on the surface and an electrical grid on the back surface (column 3, lines 1 through 9). The vias in Gee are only doped along the inner surface of the holes drilled into the substrate. Therefore the vias are not the solid conductive vias of the present invention. The present application specifically defines the conductive via to be "a solid member (e.g., cylinder, rod, plane) and is not a hollow, laser-drilled hole." (specification page 7, lines 29 and 30). Thus Gee does not anticipate the present invention and filling the holes of Gee with a solid n++ doped conductive via would destroy the invention and it would not be obvious to do so.

Kerschaver discloses a back contacted solar cell as shown in figures 1 and 2. Kerschaver also utilizes a p-type substrate and machines a number of vias through the substrate (column 5, paragraph 1). The vias are doped and then optionally filled with metal to provide a conductive path from the front to the back of the solar cell (column 5, paragraph 6, and figure 1e). The vias are solid conductive vias but are formed of metal, not an n++ doped semiconductor. Further it would not be obvious to alter the solid vias of Kerschaver because the metal provides a better conductor than a doped semiconductor and one of ordinary skill would have no reasoning to do that

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replacement. Once the semiconductor material is removed from the hole via drilling, it is more efficient to fill the hole with a better conductor such as metal rather than a doped semiconductor. Thus the present invention is allowable over Kerschaver as well.

Most of the art within the area utilizes the drilling of holes to create the conductive vias. These holes are either doped on the sides of the holes to create hollow conductors or filled with a more efficient conductor, namely a metal, than the semiconductor that was removed in the drilling. These references do not anticipate the present claim and it would not be obvious to alter these inventions to utilize semiconductor material instead of metal to fill the holes, or to fill the hollow holes with semiconductor material that was just removed in drilling. Therefore claim 1 is allowable over the prior art. Claims 2 through 15 all depend from claim 1 and are allowable for the same reasoning.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Fick whose telephone number is (571) 272-6393. The examiner can normally be reached on Monday thru Friday 7 AM to 4 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anthony Fick
AU 1753
September 12, 2006

ADF


NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700